

WHAT IS CLAIMED IS:

1. A system for performing chemical mechanical polishing (CMP) on a device, the system comprising:

a CMP pad;

5 a carriage that holds the device, wherein the CMP pad and carriage are rotatable with respect to each other and movable with respect to each other such that when the device is positioned within the carriage the device can be brought into contact with the CMP pad;

10 a slurry supply system that supplies slurry to the interface between the CMP pad and the device such that the combination of the slurry and the movement between the CMP pad and the device results in removal of material from the device;

a cleaning pad that rotates with respect to the CMP pad;

15 a cleaning solution supply system that supplies cleaning solution to the interface between the cleaning pad and the CMP pad wherein the combination of the cleaning solution and the movement between the cleaning pad and the CMP pad results in removal of contaminants from the CMP pad; and

20 a cleaning solution analyzing system that analyzes the cleaning solution after the cleaning solution has been introduced to the interface between the CMP pad and the cleaning pad and determines, based upon the analysis the cleanliness of the CMP pad following the supply of the cleaning solution to the interface.

2. The system of Claim 1, wherein the material removed from the device is metal.

3. The system of Claim 2, wherein the metal is copper.

25 4. The system of Claim 1, wherein the CMP pad and the slurry are adapted to remove copper from the device.

5. The system of Claim 1, wherein the cleaning pad is an abrasive grinding disk.

6. The system of Claim 5, wherein the abrasive grinding disk is a diamond impregnated disk.

7. The system of Claim 1, wherein the cleaning solution is adapted to remove the copper oxides from the CMP pad.

5 8. The system of Claim 7, wherein the cleaning solution comprises ammonium citrate.

9. The system of Claim 8, wherein the cleaning solution is 5% ammonium citrate.

10 10. The system of Claim 8, wherein the cleaning solution contains nitric acid in range of 0.001 – 0.5% by weight.

11. The system of Claim 1, wherein the cleaning solution analyzing system comprises an optical analyzing system and a chemical analyzing system, the optical analyzing system comprising a light source and a light detector, wherein the light source directs a light into the cleaning solution towards the light detector, wherein the light detector detects changes to the light induced by the cleaning solution.

12. The system of Claim 11, wherein the changes to the light induced by the cleaning solution comprise changes in refraction and absorption.

13. The system of Claim 12, wherein the refraction and absorption of the light depend on the concentration of ions in the cleaning solution.

20 14. The system of Claim 13, wherein the ions are copper ions from dissolved copper oxides.

15. The system of Claim 11, wherein the chemical analyzing system samples the cleaning solution and determines the concentrations of the contaminants.

25 16. A system for analyzing the cleanliness of a CMP pad that is cleaned by a combination of mechanical abrasion and a cleaning solution flow, the system for analyzing the cleanliness comprising:

a light source that projects a beam of light into the cleaning solution flow after the cleaning solution has been introduced onto the CMP pad during and after the mechanical abrasion;

a detector that receives the light from the light source; and

a controller that receives signals from the detector that are indicative of at least one characteristic of the light that is travelling through the cleaning solution flow, wherein the controller determines the cleanliness of the CMP pad based upon the signals received from the detector.

17. The system for analyzing the cleanliness of Claim 16, wherein the beam of light is a beam of HeNe laser.

18. The system for analyzing the cleanliness of Claim 16, wherein the detector is a pin-diode array, wherein the pin-diode array can resolve the detected beam of light spatially and by intensity.

19. The system for analyzing the cleanliness of Claim 16, wherein the signals from the detector comprise a change in the location and a change in the intensity of the detected beam of light.

20. The system for analyzing the cleanliness of Claim 19, wherein the change in the location of the detected beam of light is caused by a change in refraction of the beam of light in the cleaning solution flow, wherein the change in refraction is caused by a change in the concentration of contaminants in the cleaning solution flow, wherein the concentration of contaminants in the cleaning solution flow is indicative of the cleanliness of the CMP pad.

21. The system for analyzing the cleanliness of Claim 19, wherein the change in the intensity of the detected beam of light is caused by a change in absorption of the beam of light in the cleaning solution flow, wherein the change in absorption is caused by the change in the concentration of contaminants in the cleaning solution flow, wherein the concentration of contaminants in the cleaning solution flow is indicative of the cleanliness of the CMP pad.

22. A method of cleaning a CMP pad to remove contaminants from the CMP pad, the method comprising:

(i) cleaning pad relative the CMP pad to clean the CMP pad;

(ii) providing fluid to the interface between the cleaning pad and the CMP pad so as to facilitate cleaning of the CMP pad;

(iii) evaluating a characteristic of the fluid after the fluid has been provided to the interface to determine a fluid characteristic value that is indicative of the condition of the CMP pad;

(iv) repeating (i), (ii), (iii) until the fluid characteristic value corresponds to at least one preselected endpoint values.

23. The method of Claim 22, wherein moving the cleaning pad relative the CMP pad comprises grinding the CMP pad with the cleaning pad, the cleaning pad comprising a diamond disk.

24. The method of Claim 22, wherein providing fluid comprises providing fluid that reacts with contaminants in the CMP pad, the fluid comprising 5% ammonium citrate with nitric acid in range of 0.001 – 0.5% by weight.

25. The method of Claim 22, wherein evaluating the fluid comprises measuring optical properties of the fluid and measuring chemical composition of the fluid.

26. The method of Claim 25, wherein measuring optical properties comprises measuring change in refraction of light travelling through the fluid due to change in concentration of contaminants in the fluid, as well as measuring change in absorption of the light in the fluid due to the change in concentration of contaminants in the fluid.

27. The method of Claim 25, wherein measuring the chemical composition of the fluid comprises measuring the concentration of the contaminants in the fluid.